



New Zealand Pretend Qualifications Authority

## Level 2 Chemistry

91164 (2.4): Demonstrate understanding of bonding, structure, properties and energy changes.

### NCEA LEVEL 2 CHEMISTRY REVISION

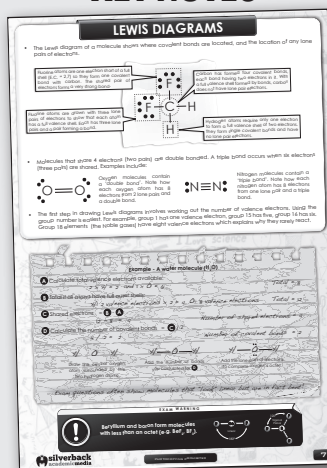
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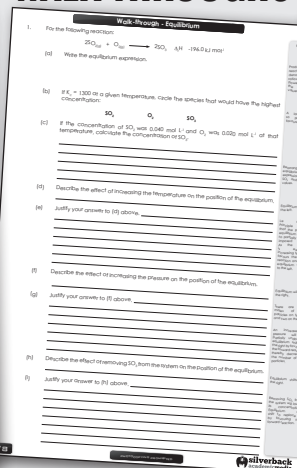
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### KEY NOTES

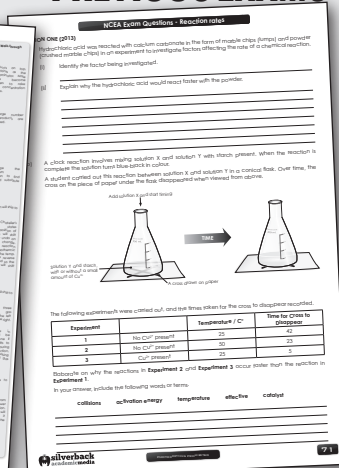


Key notes and worked examples.

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Achievement Criteria		
Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of bonding, structure, properties and energy changes. <input type="checkbox"/>	Demonstrate in-depth understanding of bonding, structure, properties and energy changes. <input type="checkbox"/>	Demonstrate comprehensive understanding of bonding, structure, properties and energy changes. <input type="checkbox"/>
Overall Level of Performance		<input type="checkbox"/>

**QUESTION ONE: BONDING, STRUCTURE AND PROPERTIES.**

1. Sodium bromide (NaBr) has a melting point of 770 °C. In terms of the structure and bonding within the compound, explain why it has such a **high melting point**.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

2. Sodium bromide (NaBr) is **soluble** in water (90 g / 100 mL). Discuss sodium bromide dissolving in water in terms of the structure and bonding of the solute and solvent.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

3.

(a)

Lewis structures for two molecules are given below.

Molecule	H <sub>2</sub> S	CH <sub>4</sub>
Lewis diagram	$\text{H} - \overset{\cdot\cdot}{\underset{\cdot\cdot}{\text{S}}} - \text{H}$	$\begin{array}{c} \text{H} \\   \\ \text{H} - \text{C} - \text{H} \\   \\ \text{H} \end{array}$

For each molecule, name the shape of the molecule and give a reason for your answer.

H<sub>2</sub>S Shape: \_\_\_\_\_

Reason:

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CH<sub>4</sub> Shape: \_\_\_\_\_

Reason:

[illegible]

(b) State the polarity of each of these molecules.

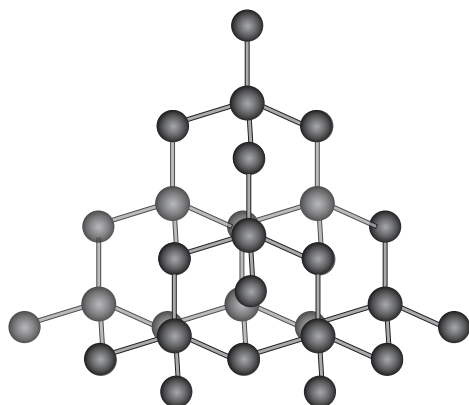
(i)	$\text{H}_2\text{S}$	<b>Polar</b>	<b>Non-polar</b>
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(ii)	$\text{CH}_4$	<b>Polar</b>	<b>Non-polar</b>
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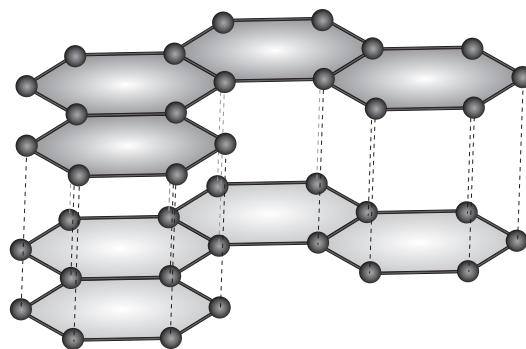
(c) For each molecule, give a justification for your choice.

[illegible]

4. The diagrams below show 3-D structural representations of diamond and graphite. Diamond and graphite are both made up of carbon atoms, but these atoms are arranged differently in each solid.



### Structure of diamond



### Structure of graphite

- (a) Describe the electrical conductivity and hardness of diamond and graphite.

## Diamond

Electrical conductivity: \_\_\_\_\_

Hardness: \_\_\_\_\_

## Graphite

Electrical conductivity: \_\_\_\_\_

Hardness: \_\_\_\_\_

- (b) Discuss the electrical conductivity and hardness of both diamond and graphite, using your knowledge of structure and bonding.

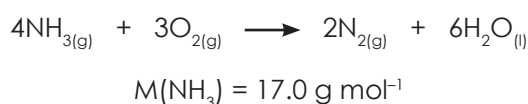
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## QUESTION TWO: ENERGY CHANGES

1. Classify the following reactions, by writing in the box below the word '**Exothermic**' or '**Endothermic**'.

	Exothermic or Endothermic
$\text{C}_2\text{H}_{4(g)} + \text{H}_2\text{O}_{(g)} \longrightarrow \text{C}_2\text{H}_5\text{OH}_{(g)} \quad \Delta_r H = -48.0 \text{ kJ mol}^{-1}$	
$\text{H}_2\text{O}_{(g)} \longrightarrow \text{H}_2\text{O}_{(l)}$	
$\text{CH}_{4(g)} + \text{H}_2\text{O}_{(g)} \longrightarrow \text{CO}_{(g)} + 3\text{H}_{2(g)}$ 206 kJ of energy is absorbed.	
When zinc powder reacts with copper sulfate solution, the temperature rises.	

2. When a 12.2 g sample of ammonia is burned, 275 kJ of energy is released.  
Calculate the energy released for the reaction below, when four moles of ammonia are burned.




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3. Methane reacts with oxygen according to the following reaction:



Use the following bond enthalpies to calculate the  $\Delta_r H$  for this reaction:

Bond	Bond enthalpy (kJ mol <sup>-1</sup> )
O-H	463
O=C	745
O=O	498
C-H	412

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